

Patent Claims

1. Diffuser sheet for LCD applications encompassing at least one light-scattering polymethyl methacrylate layer which comprises a polymethyl methacrylate matrix and also from 0.5 to 59.5% by weight, based on the weight of the light-scattering polymethyl methacrylate layer, of spherical scattering particles (A) whose median size V_{50} is in the range from 0.1 to 40 μm , and whose refractive index differs from that of the polymethyl methacrylate matrix by a value in the range from 0.02 to 0.2, and from 0.5 to 59.5% by weight, based on the weight of the light-scattering polymethyl methacrylate layer, of spherical particles (B) whose median size V_{50} is in the range from 10 to 150 μm and whose refractive index differs from that of the polymethyl methacrylate matrix by a value in the range from 0 to 0.2, where the total concentration of the spherical scattering particles (A) and particles (B) is in the range from 1 to 60% by weight, based on the weight of the light-scattering polymethyl methacrylate layer, and the spherical scattering particles (A) and spherical particles (B) have a different median particle size V_{50} , where the transmittance of the diffuser sheet is in the range from 20 to 70% and its scattering power is greater than 0.3, characterized in that the ratio of the square of average surface roughness of the polymethyl methacrylate layer R_z to the third power of the size of the spherical particles (B) R_z^2/D_{PB}^3 is in the range from 0.0002 to 0.1300 μm^{-1} .
- 35 2. Diffuser sheet according to Claim 1, characterized in that the ratio of the square of average surface roughness of the polymethyl methacrylate layer R_z to the third power of the size of the spherical

particles (B) R_z^2/D_{PB}^3 is in the range from 0.0009 to 0.0900 μm^{-1} .

3. Diffuser sheet according to Claim 1 or 2,
5 characterized in that the ratio of concentration of the particles (B) c_{PB} to the thickness of the light-scattering polymethyl methacrylate layer d_s c_{PB}/d_s is greater than or equal to 2.5% by weight/mm.
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4. Diffuser sheet according to any of the preceding claims, characterized in that the gloss R 85° of the light-scattering polymethyl methacrylate layer is smaller than or equal to 40.
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5. Diffuser sheet according to any of the preceding claims, characterized in that the ratio $c_{PA} * d_s / D_{PA}^3$ is in the range from 0.0025 to 0.3% by weight*mm/ μm^2 .
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6. Diffuser sheet according to any of the preceding claims, characterized in that the ratio $c_{PB} * d_s / D_{PB}^3$ is in the range from 0.00005 to 0.02% by weight*mm/ μm^2 .
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7. Diffuser sheet according to any of the preceding claims, characterized in that the thickness of the light-scattering polymethyl methacrylate layer is in the range from 1 to 10 mm.
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8. Diffuser sheet according to any of the preceding claims, characterized in that the spherical particles (B) encompass crosslinked polystyrene, polysilicone and/or crosslinked poly(meth)-acrylates.
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9. Diffuser sheet according to any of the preceding claims, characterized in that the scattering particles (A) encompass BaSO₄.

10. Diffuser sheet according to any of the preceding claims, characterized in that the matrix of the light-scattering polymethyl methacrylate layer has
5 a refractive index in the range from 1.46 to 1.54, measured for the sodium D line (589 nm) and at 20°C.
11. Diffuser sheet according to any of the preceding
10 claims, characterized in that the average surface roughness R_z of the sheet is in the range from 6 to 30 μm .
12. Diffuser sheet according to any of the preceding
15 claims, characterized in that the median size V_{50} of the spherical particle (B) is greater by at least 5 μm than the median size of the scattering particles (A).
- 20 13. Diffuser sheet according to any of the preceding claims, characterized in that the median size V_{50} of the spherical scattering particles (A) is in the range from 2 to 15 μm .
- 25 14. Diffuser sheet according to any of the preceding claims, characterized in that the median size V_{50} of the spherical particles (B) is in the range from 15 to 70 μm .
- 30 15. Diffuser sheet according to any of the preceding claims, characterized in that scratches produced on the sheet using a force of at most 0.7 N are not visually detectable.
- 35 16. Diffuser sheet according to any of the preceding claims, characterized in that the long-term service temperature of the sheet is at least 60°C.

17. Diffuser sheet according to any of the preceding claims, characterized in that the modulus of elasticity of the sheet is at least 2000 MPa.
- 5 18. Diffuser sheet according to any of the preceding claims, characterized in that the longitudinal expansion of the sheet due to heating by at least 20°C is at most 5%.
- 10 19. Diffuser sheet according to any of the preceding claims, characterized in that the weathering resistance of the sheet to DIN 53 387 is at least 5000 hours.
- 15 20. Diffuser sheet according to any of the preceding claims, characterized in that the transmittance of the sheet is in the range from 40 to 65%.
- 20 21. Diffuser sheet according to any of the preceding claims, characterized in that the yellowness index of the sheet is smaller than or equal to 12.
- 25 22. Diffuser sheet according to any of the preceding claims, characterized in that the halved-intensity angle of the sheet is greater than or equal to 15°.
- 30 23. Diffuser sheet according to any of the preceding claims, characterized in that the scattering power of the sheet is greater than or equal to 0.45.
- 35 24. Process for producing a diffuser sheet according to any of Claims 1 to 23, characterized in that a moulding composition encompassing polymethyl methacrylate, spherical scattering particles (A) and spherical particles (B) is extruded.
25. Use of a diffuser sheet according to any of Claims 1 to 23 in optical applications.

26. Use according to Claim 25 as rear-projection screen.